



PATENT APPLICATION

#5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Thad G. Walker,
Bien Chann,
Ian A. Nelson

Date: March 22, 2001

Docket No.: 032026:0486

Serial No.: 09/706,088

Group Art Unit: 2881

Filed: November 3, 2000

For: **FREQUENCY-NARROWED HIGH POWER DIODE LASER ARRAY
WITH EXTERNAL CAVITY**

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Box MISSING PARTS, Commissioner for Patents, U.S. Patent and Trademark Office, Washington, D.C. 20231 on March 22, 2001.

Harry C. Engstrom

(Name of applicant, assignee
or Registered Representative)

(Signature)

March 22, 2001

(Date of Signature)

INFORMATION DISCLOSURE STATEMENT

Box MISSING PARTS

Commissioner for Patents

U.S. Patent and Trademark Office

Washington, D.C. 20231

Dear Sir:

With respect to the examination of the above-referenced application, applicants cite the following documents, copies of which are enclosed. These documents are also listed on an accompanying Form PTO-1449.



UNITED STATES PATENTS

<u>Inventor(s)</u>	<u>Patent No.</u>	<u>Issue Date</u>
Sizer, II	5,206,878	April 27, 1993
Mooradian	5,289,485	Feb. 22, 1994
Luecke	5,319,668	June 7, 1994
Mooradian	5,327,447	July 5, 1994
Lang, et al.	5,337,328	August 9, 1994
Wang, et al.	5,524,012	June 4, 1996
Dixon	5,572,542	Nov. 5, 1996
LeFevre, et al.	5,594,744	Jan. 14, 1997
Snyder	5,636,059	June 3, 1997
McMinn, et al.	5,734,672	March 31, 1998
Lang, et al.	5,771,252	June 23, 1998
Stephens, et al.	5,913,108	June 15, 1999

OTHER DOCUMENTS

Michael G. Littman, et al., "Spectrally Narrow Pulsed Dye Laser Without Beam Expander," Applied Optics, Vol. 17, No. 14, 15 July 1978, pp. 2224-2227.

W.F. Sharfin, et al., "High-Power, Diffraction-Limited, Narrow-Band, External-Cavity Diode Laser," App. Phys. Lett., Vol. 54, No. 18, 1 May 1989, pp. 1731-1733.

Carl E. Wieman, et al., "Using Diode Lasers for Atomic Physics," Rev. Sci. Instrum., Vol. 62, No. 1, January, 1991, pp. 1-20.

Chi-Luen Wang, et al., "Tunable Dual-Wavelength Operation of a Diode Array with an External Grating-Loaded Cavity," Appl. Phys. Lett., Vol. 64, No. 23, 6 June 1994, pp. 3089-3091.

E.R. Brown, et al., "Milliwatt Output Levels and Superquadratic Bias Dependence in a Low-Temperature-Grown GaAs Photomixer," Appl. Phys. Lett., Vol. 64, No. 24, 13 June 1994, pp. 3311-3313.

Thad G. Walker, et al., "Spin-Exchange Optical Pumping of a Noble-Gas Nuclei," Rev. of Modern Physics, Vol. 69, No. 2, April 1997, pp. 629-642.

A.K. Goyal, et al., "Stable Single-Frequency Operation of a High-Power External Cavity Tapered Diode Laser at 780 nm," Appl. Phys. Lett., Vol. 71, No. 10, 8 September 1997, pp. 1296-1298.

A. Ben-Amar Baranga, et al., "Polarization of ^3He by Spin Exchange with Optically Pumped Rb and K Vapors," Physical Review Letters, Vol. 80, No. 13, 30 March 1998, pp. 2801-2804.

Ming-Wei Pan, et al., "Fiber-Coupled High-Power External-Cavity Semiconductor Lasers for Real-Time Raman Sensing," Applied Optics, Vol. 37, No. 24, 20 August 1998, pp. 5755-5799.

Ming-Wei Pan, et al., "Spatial and Temporal Coherence of Broad-Area Lasers with Grating Feedback," J. Opt. Soc. Am. B, Vol. 15, No. 10, October, 1998, pp. 2531-2536.

Torkild Eriksen, et al., "Rocketborne Rayleigh Lidar for *in situ* Measurements of Neutral Atmospheric Density," Applied Optics, Vol. 38, No. 12, 10 April 1999, pp. 2605-2613.

L. Hsu, et al., "Frequency Tracking and Stabilization of a Tunable Dual-Wavelength External-Cavity Diode Laser," Optics Communications, Vol. 168, 1 September 1999, pp. 195-200.

V. Daneu, et al., "Spectral Beam Combining of a Broad-Stripe Diode Laser Array in an External Cavity," Optics Letters, Vol. 25, No. 6, March 15, 2000, pp. 405-407.

Martin Lobel, et al., "Tunable single-mode operation of a high-power laser-diode array by use of an external cavity with a grating and photorefractive phase-conjugate mirror," J. Opt. Soc. Am. B, Vol. 15, No. 7, July 1998, pp. 2000-2005.

Hiroyuki Asakura, et al., "External cavity semiconductor laser with a Fourier grating and an aspheric lens," Applied Optics, Vol. 32, No. 12, 20 April 1993, pp. 2031 - 2038.

R. J. Jones, et al., "Near-diffraction-limited high power (~ 1 W) single longitudinal mode CW diode laser tunable from 960 to 980 nm," IEE, 9 August 1995.

P. Gavrilović, et al., "High-power grating tuned semiconductor diode lasers and single-frequency diode-pumped Nd:YAG microcavity lasers," Joint Soviet-American Workshop on the Physics of Semiconductor Lasers, May 20 - June 3, 1991, pp. 37 - 48.

Haim Lotem, et al., "Tunable external cavity diode laser that incorporates a polarization half-wave plate," Applied Optics, Vol. 31, No. 36, 20 December 1992, pp. 7530 - 7532.

T. Earles, et al., "Narrow spectral width (< 1 Å FWHM), 1.1-W cw operation from 100- μ m stripe DFB diode lasers ($\lambda = 0.893$ μ m) with Al-free optical-confinement region," CLEO 1998, Monday Morning, pp. 38 - 39.

Gabriele Ferrari, et al., "High-power multiple-frequency narrow-linewidth laser source based on a semiconductor tapered amplifier," Optics Letters, Vol. 24, No. 3, February 1, 1999, pp. 151 - 153.

Mats Hagberg, et al., "5-W 930-nm tunable external-cavity laser," CLEO 1998, Monday Morning, p. 40 - 41.

Haim Lotem, et al., "Tunable dual-wavelength continuous-wave diode laser operated at 830 nm," Applied Optics, Vol. 32, No. 27, 20 September 1993, pp. 5270 - 5273.

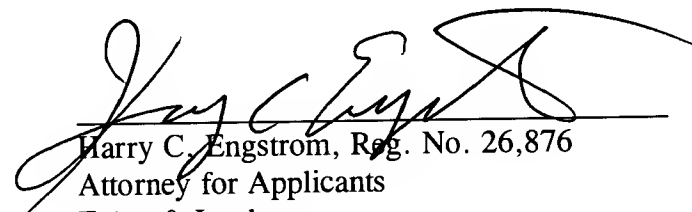
D. Wandt, et al., "External cavity laser diode with 40 nm continuous tuning range around 825 nm," Optics Communications, Vol. 130, 15 September 1996, pp. 81-84.

REMARKS

The foregoing documents relate to external cavity diode lasers, related optical systems, and spin exchange optical pumping of noble gases.

It is thus requested that the foregoing documents be considered during examination of the above-referenced application and be specifically made of record therein.

Respectfully submitted,



Harry C. Engstrom, Reg. No. 26,876
Attorney for Applicants
Foley & Lardner
150 East Gilman Street
Post Office Box 1497
Madison, Wisconsin 53701-1497
(608) 258-4207